

Sustainable construction and green building: the case of Malaysia

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Abstract

The adoption of sustainable construction and green buildings has become an important issue in Malaysia in recent years and has been duly highlighted under the Malaysian Construction Industry Master Plan (2005–2015). This paper highlights current initiatives taken by the government and private sectors in Malaysia to encourage the adoption of sustainable development and green buildings. Leads by the Construction Industry Development Board Malaysia (CIDB), the government of Malaysia has establishment a technical committee and eco-label task force to create guideline for good practices in sustainable construction and green buildings and to develop eco-label accreditation scheme for construction materials. The challenges of the adoption are lack of skill and capacity, overlapping of roles among the government agencies, slow industry follows through on government programs, lack of research and innovation, and cost versus benefits in term of implementation of green technology. Finally, the way forward to accelerate the adoption are to establish green public procurement, to encourage Research and Development (R&D) in related field, to educate and change public perception and mindset, to adopt life cycle costing and Industrialised Building System (IBS) method of construction and to provide legislative and financial framework for sustainable development and green building.

Keywords: sustainable construction, green buildings, Malaysia.

1 Introduction

The construction industry in Malaysia plays an important role in generating wealth for the country and development of social and economic infrastructures



and buildings. The industry provides job opportunities for 800,000 people which represented 8% of total workforce [1]. The construction industry is one of the productive sectors that constantly contribute to the economy. Recent data showed that the construction sector growth at 5.3% in 2007 and contributed 2.1% total Gross Domestic Product (GDP) of Malaysia. The industry creates a multiplier effect to other industries, including manufacturing sector, financial and banking, agriculture, mining and professional services and has predicted by many as the catalyst of economic recovery and as a driver for the modernisation of Malaysia.

2 Problem statement

Construction industry is a major consumer of non-renewable resources and a massive producer of waste, and the operation of buildings is responsible for around half of the total CO₂ emissions. Based on a recent study in developed countries, 30-40% of natural resources were exploited by the building industry, 50% of energy used for heating and cooling in buildings, almost 40% of world consumption of materials converts to built environment and 30% of energy use due to housing [2]. The similar percentage is expected in the developing countries including Malaysia. This is a huge amount of resources and energy consumed in the building life-cycle, let alone the usage of resources and energy during the construction phase. It was recorded that more than six million tonnes of waste has been generated of which a quarter was produced in the Klang Valley alone, the most affluent area in Malaysia [3] and today, solid waste issue is one of the biggest environmental problems in Malaysia [4]. The construction exploits natural resources such as forest for timber, housing and industry without proper control that contributes to the environmental problems [5]. Many of environmental issues that occur in this country are due to lack of environmental considerations in the exploitation, development and management of resources as well as lack of control of pollution resources. These issues if not tackled strategically will further aggravate and exert challenges towards sustainable construction in the following way. It was observed that the Malaysian construction industry is still behind in waste management, rainwater harvesting and reduction of carbon footprint as compared to the developed nations.

3 Sustainable policies and commitment of Malaysia

Since the Rio and Kyoto summits, many governments have undertaken to initiate and implement national sustainable developments. Malaysian in fact, is one of the earliest nations in the world to have adopted a serious concern towards our environment by enacting the Environment Quality Act way back in 1974. Recently, the honourable Prime Minister of Malaysia in his speech at the *United Nations Framework on Climate Change Conference (Copenhagen Summit)* has stated the commitment of Malaysia to reduce the carbon dioxide emission by as much as 40% compared to 2005 levels. As a result, the Malaysian government is working on the *Green Technology Roadmap* to guide Malaysia in becoming a



low carbon green growth economy. For a start, the government is conducting a baseline study for green technology in Malaysia. The baseline study comprise the following sectors; energy, waste water, building, transportation, manufacturing and ICT. This comprehensive document incorporates inputs from various stakeholders and was completed in Dec 2010.

4 Sustainable development and green buildings initiatives in Malaysia

The Construction Industry Development Board Malaysia (CIDB) is a body to develop and modernise the Malaysian construction industry has always take a proactive actions to address the issue of sustainable construction and assist the stakeholders in its adoption. Back in June 1999, the CIDB had established a technical committee to look into developing good environmental practices in the construction industry. The *Technical Committee 9 on Good Environmental Practices in the Construction Industry (TC9)* comprises environmental experts from government agencies, professional bodies, academia and construction related associations. Six working groups have been established under the TC9 are [6]:

- Working Group 1 (WG1): Development of strategic plan and programmes for good Environment Practices.
- Working Group 2 (WG2): Development of best practices on prevention and control of soil erosion and sedimentation in construction.
- Working Group 3 (WG3): Development of good environmental practices in storm water management.
- Working Group 4 (WG4): Development of accreditation scheme for environment management system for contractor under D.I.Y Scheme. This accreditation scheme is toward the contractor's certification to ISO 14001 on environmental management systems.
- Working Group 5 (WG5): Developing guideline on environmental management system for construction industry (EMSCI). This guideline aims to assist contractors to be ISO 14001 certified and that look into the proper environment management systems in the construction industry.
- Working Group 6 (WG6): Development of training module on waste management at construction sites and guideline on good practices in construction waste management. The module is targeted to highlight project exemplars and provide insights on site practical practices on waste management.

Under the TC9, CIDB had published *Strategic Recommendations for Improving Environmental Practices in Construction Industry* which highlighted recommendation to be the strategic way forward in environment in Malaysian construction industry adopted by all players. The recommendations are summarised as follows [7]:

- Strengthening the development approval process.
- Enhancing law and enforcement.



- Promoting self-regulation, reflecting the best regulatory practices that are necessary to achieve sustainable construction in the future.
- Increasing capacity and public awareness and addressing knowledge gap.

In June 2006, the *Construction Industry Master Plan 2006-2015 (CIMP)* has been published to chart the way forward for Malaysian construction. The CIMP has identified that the demand on environmental sustainability is necessary to achieve and sustain economic growth and social development. The following milestones have been highlighted under the roadmap to be achieved in 2015 [1]:

- Foster a quality and environment-friendly culture and to increase customer demand in the global environment in construction.
- Encourage external accreditation in quality and environmental management i.e. *ISO 14001 certifications*.
- Promote environment-friendly practices.
- Initiatives on green building materials to ensure impact activities can provide in order to spur economy and social benefits at large.

Malaysian green building rating system (Malaysia Green Building Index - GBI) has been developed and widely used since 2009. This private sector driven initiative aims to promote sustainability in the built environment and raise awareness among the industry players about environment issues. Building will be awarded GBI rating score based on six key criteria; energy efficiency, indoor environment quality, sustainable site planning, material and resources, water efficiency and innovation.

In February 2010, the CIDB together with industry's stakeholders has met up to strategise the green technology and sustainable agenda. The aim is to formalise the strategic direction in green construction and sustainability. The focus areas which have been identified as the priorities and need urgent action are:

- Formulation of green technology roadmap for construction industry
- Establishing eco-labelling task force
- Standardisation of provision and legislation on green technology
- Education and awareness

Based on the output of the meeting, the CIDB is establishing technical committee for green technology best practices in construction. The technical committee is looking on four area of interest; eco-labelling, training, development of contractors and development of roadmap for green construction. As one of the most important aspect of sustainable construction and green buildings which need urgent attention, the eco-labelling task force was established comprised of captains from industries to look into the development of eco-labelling scheme for construction materials. Construction Research Institute of Malaysia (CREAM), subsidiary of CIDB has set-up product testing facilities in its laboratory to ensure construction materials to be certified as eco-label.

In line with government effort to reduce dependency on foreign workers and utilise green construction technologies, CIDB is geared toward the adoption of innovation method in construction in the form of Industrialised Building Systems (IBS). The fundamental idea of IBS is to move on-site work to more controlled



environment in a manufacturing floor. IBS promote sustainability from controlled production environment minimisation of waste generation effective usage of energy, efficient building materials, effective logistic and long term economic stability which can contribute to better investment in environment technologies. IBS also proved that wastage can be reduced greatly due to prefabrication of most of the building components. Prefabrication in factory environment enables waste reduction through process orientation that entails controlled production and standardise process. Since 2008, IBS is made compulsory in public building project, where 70% of components using in the construction must be IBS.

In closing the technological gap and changing peoples' mindset, research and development is the way ahead. Ongoing research areas in sustainable construction and green buildings funded by CIDB are:

- Construction practices for storm water management and soil erosion control for the construction industry.
- Achieving sustainability of the construction industry via *International Environmental Management Systems Standard*.
- Waste minimisation and recycling potential of construction materials.
- Materials security and waste management for Industrialised Building Systems (IBS).
- Environmental management plan in the contract tender document of construction projects.
- Utilisation of waste materials for the production of concrete pedestrian block.

5 The future outlook

New business will emerge to utilise green technologies and captured market share in the construction industry. It includes construction firms that specialise in providing consultancy services for clients which would like to use green technology. In addition there are potential markets for manufacturers to produce innovative green products in the construction business, such as panels, roof system, walls, rain-water harvesting system and solar panels. The green technology initiative also creates multiplier effect for other industry. More business can be created in the area of recycling, water purification, air purification, environmental remediation, solid waste management, renewable energy and energy conservation. Under Budget 2010, the government provides effective financial incentives through Green Technology Financial Scheme (GTFS) in the amount of RM 1.5 billion (£300 million) to explore green technology and adopt green practices. This fund will provide soft loans to companies that supply and utilise green technology. For suppliers, the maximum financing is RM 50 million (£10 million) and for consumers and companies RM 10 million (£2 million). In addition, the government is also considering tax incentives such as tax deduction for contribution towards environmental funds and tax breaks for buildings and designs that work harmoniously with nature.



For attaining a better future the government of Malaysia is in the midst of integrating green topics in the national education system and increasing modules and courses related to green technology in institutes of higher education in both public and private institutions. Further, the government creates green jobs roadmap through integrating skills training standard in National Competency Standards (NCS) and National Occupational Skills Standards (NOSS). Green ICT Working Group has been set up under the Malaysian Technical Standards Forum Berhad to actively promote the Green ICT concept in relation to the ICT industry, to set up a minimum Green ICT guideline that can be used across industries and to continuously seek to establish a sustainable ICT industry through eco-friendly technology.

However, there are several challenges in adopting sustainable construction and green building in Malaysia. The challenges are lack of skill and capacity in this area, overlapping of roles among the government agencies, slow industry follow through on government programs, lack of research and innovation, lack of understanding of environmental implications and its solutions and cost versus benefits in term of implementation of green technology. The barriers are also related to law and regulation. Currently, the government of Malaysia fails to regulate and enforce due to the lack of a legislative framework specifically for green technology or green growth. Thus, unable to apply the carrot and stick principle and reach industries/people at all levels. These issues need to be addressed to ensure successful adoption in the future.

6 Recommendation

Recommendations to accelerate the adoption of sustainable construction and green buildings in Malaysia are:

- To further incorporate and applies innovation in construction in the form of Industrialised Building System (IBS). The fundamental idea of IBS is to move on-site work to a controlled environment of manufacturing floor. IBS promote sustainability from controlled production environment minimisation of waste generation effective usage of energy, efficient building materials, effective logistic and long term economic stability which can contribute to better investment in environment technologies
- The introduction and adoption of while whole life cycle costing and green procurement in construction industry is important way forward. The concept refers to the total cost of ownership over the life of an asset. It also commonly referred to as *cradle to grave* or *womb to tomb* costs. The primary benefit of whole-life costing is that costs which occur after an asset has been constructed or acquired, such as maintenance, operation, disposal, become an important consideration in decision-making. By introducing the whole life cycle costing and green procurement, the industry has resources to plan for sustainable and use green materials when the investment is justified.
- Environmental considerations will be integrated into all stages of development, programme planning and implementation and all aspects of



policy making. Environmental inputs shall be incorporated into economic development planning activities, including regional plan, master plans, structure and local plan.

- Human capital development is one of the important elements that need to be taken onboard. A system for formulation of grading and certification mechanisms for competent personnel in green technology is the way forward. The learning curve and education syllabus on sustainable and green construction should be included right from primary education until university level.
- Research and innovation is the best way to improve and expand knowledge and technology. The government should increase grant allocation on the research related to sustainable and green construction and encourage research cluster on green issues. The research agenda needs to include benchmarking and technology transfer of best practices from developed countries in implementing sustainable and green construction agenda.
- Integrated and effective cooperation and coordination among government and other sectors shall be enhanced in order to achieve efficient environmental management and protection. Environment-related legislation and standards shall be reviewed regularly and revised where necessary to ensure the continued effectiveness and coordination of laws. Particular attention will be paid to effective enforcement. However, there is a need for clarity in the roles of the agencies to avoid confusion and overlapping in roles and programs

7 Final remarks

Mitigation to sustainable mentality requires a lot of change in attitude, innovation, creativity, research and support from many stakeholders. Construction industry must inevitably change its historic of operating with little regard for environmental impact to a new mode that makes environmental concern a centre piece of its effort. The era of sustainability is taking its stand and the construction industry must demonstrate that it can abide by this new stand. It is important for the government of Malaysia to exploit their foresight regarding this transition to maximise its potential benefit through policies supporting the development of the private demand for and supply of activities which meet this agenda. Change requires investments, and the vast majority of those investments must happen through the private sector with the government providing adequate enabling effect.

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